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㊹発明の名称　ブラウン管フォーカス回路

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Applicant: HITACHI Ltd.

明　細　書

1. 発明の名称

ブラウン管フォーカス回路

2. 特許請求の範囲

1. 4極レンズを構成する電極片がそれぞれ形成されている第1，第2の集束電極を有する電子銃を備えたブラウン管に於いて、上記第1，第2電極にフライバックトランス直流電圧発生電極からそれぞれ所望の直流電圧を供給するため第1の集束電圧調整用可変抵抗器と第2の集束電圧調整用可変抵抗器が、並列配置して構成され、これと直列に高圧側直流電圧発生電極，低圧側基準電圧間に抵抗を接続して成ると共に、第1の集束電極にはパラボラ状電圧と明るさに応じた電圧が、コンデンサを介して重畳し、第2の集束電極は、ブラウン管アノード電極とコンデンサで接続して成ることを特徴としたブラウン管フォーカス回路。

2. 4極レンズを構成する電極片がそれぞれ形成されている、第1，第2の集束電極を有する電子銃を備えたブラウン管に於いて、上記第1，第2電極に、フライバックトランス直流電圧発生電極からそれぞれ所望の直流電圧を供給するため第1の集束電圧調整用可変抵抗器と第2の集束電圧調整用可変抵抗器が並列配置して構成され、これと直列に高圧側直流電圧発生電極，低圧側基準電圧間に抵抗を接続して成ると共に、第1の集束電極にはパラボラ状電圧と明るさに応じた電圧が、コンデンサを介して重畳し第2集束電極は、基準電圧と、コンデンサで接続して成ることを特徴とした、ブラウン管フォーカス回路。

3. 発明の詳細な説明

〔産業上の利用分野〕

本発明は、ブラウン管ダイナミックフォーカス回路に関する。

〔従来の技術〕

従来の装置は、特開昭63－203063に示すようになっていた。4極レンズを構成する電極片がそれぞれ形成されている、第1，第2の集束電極を有

する電子銃を備えたブラウン管に於いて、第1，第2電極にフライバックトランス直流電圧発生電極から、それぞれ所望の直流電圧を供給するため第1の集束電圧調整用可変抵抗器と第2の集束電圧調整用可変抵抗器が並列配置して、構成されこれと直列に高圧側直流電圧発生電極，低圧側、基準電圧間に、抵抗を接続して成ると共に、第1の集束電極には、コンデンサを介してパラボラ状ダイナミックフォーカス電圧が重畳される。又、第2電極に第1電極に重畳したパラボラ電圧が漏洩して出て来ないよう、平滑コンデンサが基準電圧間に挿入されている。

〔発明が解決しようとする課題〕

上記従来技術に於いて、パラボラ状交流電圧源から垂直周期のパラボラ信号を、第1の集束電極に供給しようとした場合、交流カップル用コンデンサと、直流電圧供給用抵抗回路網のインピーダンス時定数が垂直周期の4～5倍以上でなければならない。

こうしないと垂直周期のパラボラ電圧は交流カップル用コンデンサを通して、第1の集束電極に重畳されない。

一方受信機が、画面の一部が明るい信号を受信した場合、この部分でアノード電圧が低下することが知られる。

第1の集束電圧の直流成分はアノード電圧を上記抵抗回路網で分圧して供給されるのが一般的であるが、第1の集束電圧に現われるアノード電圧に相関するリップル成分は、逆くに、分圧抵抗回路網インピーダンスと交流カップル用コンデンサ時定数で平滑され無くなる。

第1の集束電極とアノード電極の電位差で主電子レンズを構成して全体のフォーカスを合わせているが、その部分的に明るい部分で、フォーカス電圧／アノード電圧比が高目にズレ、フォーカス劣化する問題があった。

本発明の目的は、部分的に明るい部分でもフォーカス劣化しないことにある。

〔課題を解決するための手段〕

上記目的を達成するため、第1集束電極にアノード電圧リップル成分に見合う、明るさ信号に応じた電圧を、ダイナミックフォーカス用パラボラ電圧と共に重畳すると共に、

第2集束電極はコンデンサ、でアノード電極と接続する。

〔作用〕

第1の集束電極に重畳する明るさ信号に見合った電圧によりフォーカス電圧／アノード電圧比が一定に保もたれ、フォーカス劣化することはない。

また、第2集束電極とアノード電極をコンデンサで接続することにより、第2集束電極にアノード電圧リップル分が重畳すると共に、第1の集束電極から漏洩して来るダイナミックフォーカス用パラボラ電圧を除去出来、第1集束電極，第2集束電極間に、正確なパラボラ電圧が得られ、4極レンズにも副作用与えることはない。

〔実施例〕

第1図は、本発明の一実施例、第2図は、局部的に明るい絵柄を、受信した受信機画面、第3図は、ブラウン管最適フォーカス電圧特性、第4図は、第1集束電極、第2集束電極を備えた、ブラウン管電子銃構成図、第5図は、第1図各部電圧波形図である。

第1図、1…フライバックトランス、2…抵抗、3…第2集束電圧調整可変抵抗器、4…第1集束電圧調整可変抵抗器、5…抵抗、6…抵抗、7…コンデンサ、9…ダイナミックフォーカス電圧重畳用コンデンサ、10…増幅器、11…ビーム電流検出用抵抗、12，13…ローパスフィルター、14…ブラウン管である。

第2図に示す局部的に明るい絵柄を受信した場合についての本発明の動作について第1図，第5図で説明する。

第1図、11抵抗より、ビーム電流に応じた電圧が検出される。12，13のローパスフィルター回路で、水平成分が除去され、明るさに応じた垂直周期の包絡線電圧波形が得られる。第5図bで示す。

又、a点よりダイナミックフォーカスパラボラ電圧が供給される。明るさ信号と合成された後、10増幅器で増幅される。合成波形を、第5図cで

示す。

交流結合用コンデンサ9を通じ合成波形を第1集束電極に重畳する。

一方直流成分は、フライバックトランス中点タップ電極電圧より2抵抗，4可変抵抗器、5抵抗で分圧されて、供給される。

第1集束電極波形を第5図dで示す。

一方、第2集束電極には、アノード電圧のリップル成分が、コンデンサ7を通じて重畳する。

直流成分は、第1集束電圧と同様にフライバックトランス中点タップ電極電圧より2抵抗，3可変抵抗器、5抵抗で分圧されて供給される。第2集束電極波形を第5図fに示す。

ここで7コンデンサは、第1集束電極d点に供給されたダイナミックフォーカス用パラボラ電圧と明るさ信号の合成波形が可変抵抗器3，4、抵抗6を通して、第2集束電極に漏洩して来る成分をこの抵抗インピーダンスと7コンデンサの積分作用で平滑する役目も兼ねている。

ここで、新たに、アノード電極から7コンデンサを通して、第2集束電極に供給されたアノード電圧リップル成分と同様波形になるよう、第1集束電極に重畳するビーム電流検出抵抗11から得た、明るさ電圧波形bを、抵抗12、コンデンサ13積分で近似させることにより、正確に、効率よく、第1集束電極，第2集束電極間に、パラボラ電圧を得、正確な4極レンズを構成することが出来る。

又、第1集束電極に上記したようにアノード電圧リップル成分と、近似した電圧波形を重畳することにより、フォーカス電圧／アノード電圧比を一定に保ち、主レンズを正常に動作させることが出来、フォーカス劣化することはない。

又、ここでコンデンサ7の接続を第1の実施例の第2集束電極とアノード間から、第2集束電極と基準電圧間に接続変更すれば、第2図に示す。局部的に明るい画面でよりフォーカスの向上が期待出来るので、第6図，第7図を用いて説明する。

パソコン文字受信等、画面全体が暗い場合に於いては、従来例、と同様副作用なく4極レンズによるダイナミックフォーカス効果を得るので、公知例で知られている技術であるがまず説明する。

この場合は、アノード電極（G4）の画面内容に応じたリップル電圧は小さい。

抵抗2，第1集束電圧調整用可変抵抗器4を通じて、第1集束電極に供給している直流電圧に重畳している、画面明るさに応じたリップル電圧分も小さくコンデンサ9により平滑されても、フォーカス電圧／アノード電圧比は変化せず、主レンズによるフォーカス劣化はない。

又、第1集束電極にコンデンサ9を通じて、印加したほぼパラボラ状電圧（画面暗いためc電圧に明るさ成分重畳されない）は、第2集束電極にはコンデンサ7で平滑され現われず、第1集束電極、第2集束電極間にパラボラ状電位差を生じさせ、公知例通りの画面周辺フォーカス向上を行なうことが出来る。

第2図に示す局部的に明るい画面を受信した場合に於いては、bに明るさ信号が発生し、この成分がパラボラ電圧と加算されて、第1集束電極に乗る。

第2集束電極電圧は、コンデンサ7の平滑作用により、ほぼ直流成分のみとなり、第1集束電極，第2集束電極間には、パラボラ電圧＋明るさに応じた電圧が印加される。

第1集束電圧と第2集束電圧の関係を第7図に示す。

画面明るい部分に於いて、両電極間の電位差が、暗い場合と比べて、より大になり、4極レンズ作用が強まりより過集束になる。

ここで一般ブラウン管の最適フォーカス電圧特性は第3図になっているのが一般的であり、高ビーム電流領域に於いて、よりフォーカス電圧を下げ過集束にする必要があることが知られる。

本実施例では、画面暗い場合は、フォーカス比一定を保ち、高ビーム電流領域に於いてはアノード電極と第1集束電極とで構成される主レンズのフォーカス劣化を抑えると共に、4極レンズを、過集束状態にすることが出来、一般ブラウン管フォーカス特性に合った使い方が出来、フォーカス向上期待出来る。

〔発明の効果〕

本発明によれば従来技術から比べて部品点数、原価をほとんど上昇させることなく特に第2集束電極に接続されるコンデンサは接続位置を変更するだけでよく、廉価に構成される効果がある。

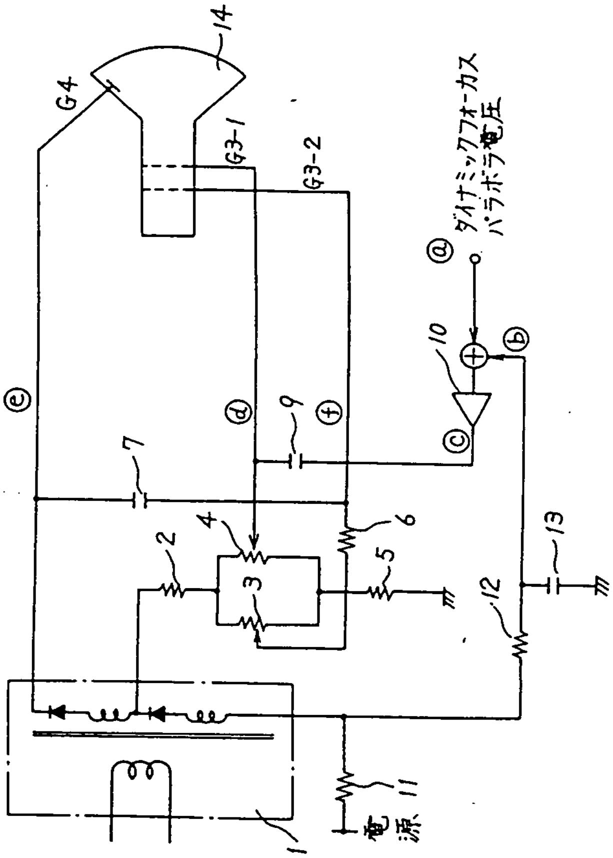
4. 図面の簡単な説明

第1図は本発明の一実施例図、第2図は局部的に明るい絵柄を受信した受信機画面図、第3図はブラウン管最適フォーカス電圧特性図、第4図は、第1集束電極、第2集束電極を備えた、ブラウン管電子銃構成図、第5図は、第1図各部電圧波形図、第6図は本発明の第2実施例図、第7図は、第6図の第1集束電圧、第2集束電圧関係図である。

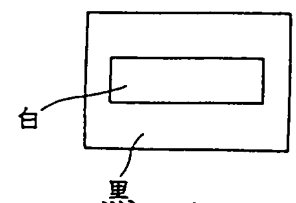
1…フライバックトランス、
3…第2集束電圧調整可変抵抗器、
4…第1集束電圧調整可変抵抗器、
7…アノード電圧リップル重畳用コンデンサ、
9…ダイナミックフォーカス電圧重畳用コンデンサ、

代理人弁理士 小 川 勝 男

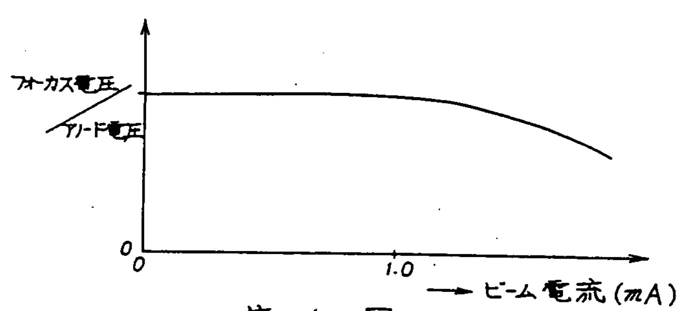
第1図



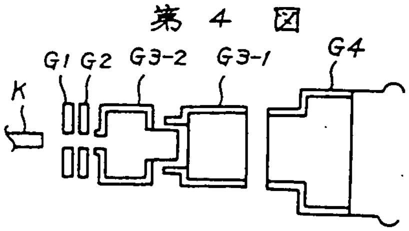
第2図



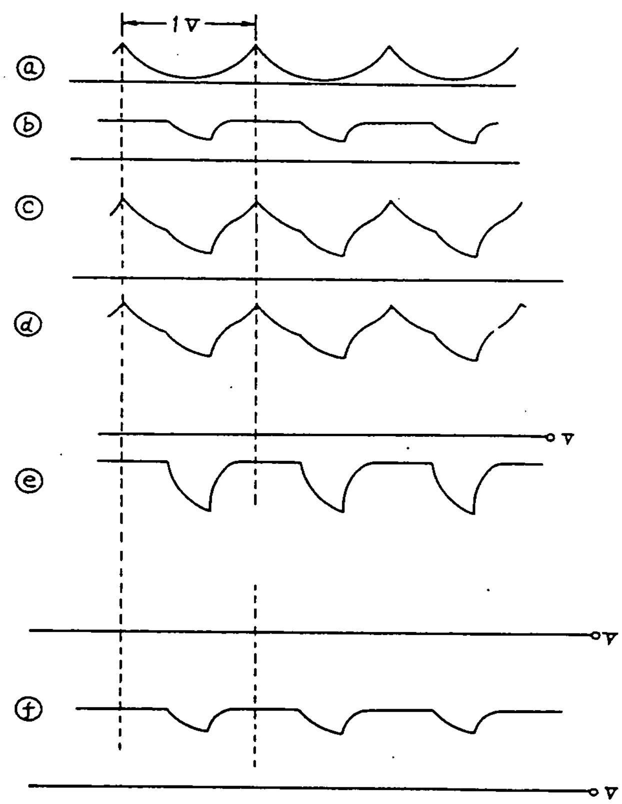
第3図



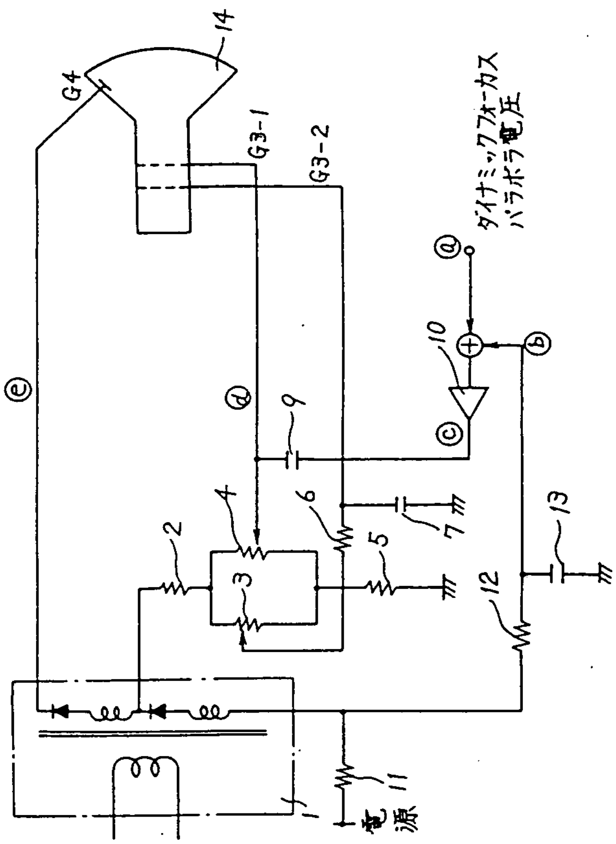
第4図



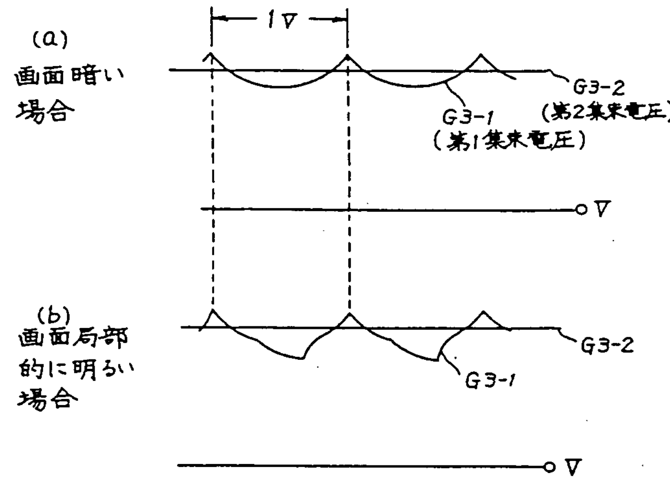
第5図



第 6 図


14
G4
G3-1
G3-2
ダイナミックフォーカス
パラボラ電圧
ⓐ
ⓑ
ⓒ
ⓓ
ⓔ
10
9
4
6
7
2
5
3
13
12
11
1
電源

第 7 図


1V
(a)
画面暗い
場合
G3-2
(第2集束電圧)
G3-1
(第1集束電圧)
V
(b)
画面局部
的に明るい
場合
G3-2
G3-1
V

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(51) Int. Cl.^{5} H 04 N 3/26, 5/228, 9/28
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Intra-office Coordination Nos. 7037-5C, 8942-5C, 7033-5C
(43) Kokai Date: February 18, 1992
Request for Examination: Not filed as yet.
Num-er of Claims: Two
(Total No. of Pages - Five)

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(54) Title of Invention: Braun Tube Focu s Circuit

(21) Patent Application No. Hei 2-157520
(22) Date of Application: June 18, 1990

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(71) Applicant: Kabushiki Kaisha Hitachi Seisakusho, Six Kanda Suruga-dai 4-chome, Chiyoda Ku, Tokyo
(74) Agent: Katsuo Ogawa, patent attorney, and one other

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Specification

1. Title of Invention: Braun Tube Focus Circuit

2. Scope of Claims for Patent:

1. A braun tube focus circuit which is equipped with electron guns having the first and second convergent electrodes wherein there are formed electrode pieces constituting a four-eye lens, chacterized in that a first variable resistor for convergent voltage adjustment and the second variable resistor for convergent voltage adjustment whose purpose it is to supply the respectively desired direct current voltage from the flyback transformer direct current generating electrode to the said first and second electrodes are arranged in parallel, with a resistance being connected in series between the direct current voltage generating electrode on the high presssure side and the standard voltage on the low pressure side, and, at the same time, a vol-

tage which is in conformity with the brightness as well as the parabola-shaped voltage are superimposed on the first convergent electrode through a condenser and the second convergent electrode is connected with the braun tube anode electrode with a condenser.

2. A braun tube focus circuit in the braun tube which is equipped with the first and second convergent electrodes wherein there are formed electrode pieces constituting a four-eye lens, characterized in that a first variable resistor for convergent voltage adjustment and a second variable resistor for convergent voltage adjustment whose purpose it is to supply the respectively desired direct current voltage to the said first and second electrodes from the flyback transformer direct current voltage generating electrode are arranged in parallel, a resistance being connected between the direct current voltage generating electrode on the high pressure side and the standard voltage on the low pressure side in series with same and, at the same time, a parabola-shaped voltage and a voltage which is in conformity with the brightness are superimposed on the first convergent electrode through a condenser and the second convergent electrode is connected with the standard voltage with a condenser.

3. Detailed Explanation of the Invention

(Field of Industrial Utilization)

This invention relates to the braun tube dynamic focus circuit.

(Technology According to Prior Art)

The device according to prior art is as shown in Toku Kai Sho 63-203063. In a braun tube which is equipped with electron guns having the first and second convergent electrodes, wherein there are formed electrode pieces constituting a flour-eye lens, the first variable resistor for convergent voltage adjustment and the second variable resistor for convergent voltage adjustment whose purpose it is to supply the respectively

desired direct current voltages from the flyback transformer direct current voltage generating electrode to the first and second electrodes are arranged in parallel, with a resistance being connected in series with this between the direct current voltage generating electrode on the high pressure side and the standard voltage on the low pressure side and , at the same time, a parabola-shaped dynamic focus voltage is superimposed on the first convergent electrode through a condenser. In addition, a smoothing condenser is inserted between the standard voltages so that the parabola voltage that has been superimposed on the first electrode amy not leak out to the second electrode.

(Problem to be Solved by the Invention)

According to the conventional technology that has been described above, when it is desired to supply the parabola signal of the vertical cycle from the parabola-shaped alternating current voltage source to the first convergent electrode, it is necessary for the condenser for alternating current coupling and the impedance time constant of the resistance circuit network for the supply of the direct current voltage to be more than four to five times the vertical cycle.

Otherwise, the parabola voltage of the vertical cycle is not superimposed on the first convergent electrode through the condenser for alternating current coupling.

It is known, meanwhile, that, in the case where the receiver has received a signal with a part of the scene being bright, the anodic voltage comes down at that part.

It is ordinarily the case that the direct current component of the first convergent voltage is pressure-divided by the said resistance circuit network for supply. However, the ripple component which is in correlationship with the anode voltage appearing in the first convergent voltage, on the contrary, is smoothed by the pressure division resistance circuit network impedance and the condenser time constant for alternating current coupling to disappear.

The main electron lens is constituted by the first convergent electrode and the anode electrode, thereby achieving the over-all focusing. However, there is a problem in that a partially bright part shifts the focus voltage/anode voltage somewhat higher, thereby bringing about a deterioration of focusing.

The purpose of this invention lies in the prevention of any focus deterioration even in a partially bright part.

(Means for Solving the Problem)

In order to achieve the above-described objective, a voltage which is in conformity with the brightness signal corresponding to the anode voltage ripple component is superimposed at the first convergent electrode along with the parabola voltage for dynamic focusing, and, at the same time, the second convergent electrode is connected with the anode electrode by means of a condenser.

(Function)

Because of the voltage which is in conformity with the brightness signal that is superimposed on the first convergent electrode, the focus voltage/anode voltage ratio is maintained constant without any focus deterio-

ration.

As the second convergent electrode and the anode electrode are connected by means of a condenser, moreover, the anode voltage ripple component is superimposed on the second convergent electrode and, at the same time, the parabola voltage for dynamic focusing that leaks out of the first convergent electrode can be eliminated and an accurate parabola voltage is obtained between the first convergent electrode and the second convergent electrode, without giving any adverse effect upon the four-eye lens.

(Example)

Figure 1 shows an example of this invention. Figure 2 shows a receiver screen that has received a locally bright design. Figure 3 shows the braun tube optimal focus voltage characteristics, Figure 4 shows the structure of a braun tube electron gun which has been equipped with the first convergent electrode and the second convergent electrode. Figure 5 shows the waveforms of various parts in Figure 1.

In Figure 1, the following codes have been used:

1. Flyback transformer
2. Resistance
3. Second convergent voltage adjustment variable resistor
4. First convergent voltage adjustment variable resistor
5. Resistance
6. Resistance
7. Condenser
9. Dynamic focus voltage superimposition condenser
10. Amplifier
11. Resistance for beam electric current detection

12 and 13. Low pass filters

14. Braun tube

The action of this invention in the case where a design which is locally bright has been received as shown in Figure 2 will be explained by referring to Figures 1 and 5.

In Figure 1, a voltage which is in conformity with the beam electric current is detected from resistance 11. The horizontal component is eliminated by the low pass filter circuits 12 and 13, with a consequence that the envelope voltage waveform of a vertical cycle which is in conformity with the brightness is obtained. This is shown in Figure 5b.

In addition, dynamic focus parabola voltage is supplied from point a. After being synthesized with a brightness signal, it is amplified by the amplifier 10. The synthesized waveform is shown in Figure 5c.

The synthesized waveform is superimposed on the first convergent electrode through a condenser 9 for alternating current combination.

Meanwhile, the direct current component is supplied by being pressure-divided by the resistance 2, the variable resistor 4 and the resistance 5 from the flyback transformer mid-point tap electrode voltage.

The first convergent electrode waveform is shown in Figure 5d.

On the second convergent electrode, meanwhile, the ripple component of the anode voltage is superimposed through a condenser 7.

The direct current component is supplied by being pressure-divided by the resistance 2, the variable resistor 3 and the resistance 5 from the flyback trans-

former mid-point tap electrode voltage as in the case of the first convergent voltage. The second convergent elect rode waveform is shown in Figure 5f.

Here, the condenser 7 also plays the role of smoothing the component that leaks to the second convergent electrode from the synthesized waveform of the parabola voltage for dynamic focus that has been supplied to point d of the first convergent electrode through the variable resistors 3 and 4 and the resistance 6 by the integrating action of the condenser 7 and this resistance impedance.

Here, it becomes possible to obtain a parabola voltage accurately and efficiently between the first convergent electrode and the se cond convergent elect- rode, thereby constituting an accurate four-eye lens, by making the brightness voltage waveform as obtained from the beam electric current detection resistance 11 that is superimposed on the first convergent electrode by using the resistance 12 and condenser 13 integration so as to achieve a waveform which is similar to the anode voltage ripple component that has been supplied to the second convergent electrode from the anode electrode through the condenser 7.

In addition, it becomes possible to maintain the focus voltage/anode voltage ratio constant, thereby causing the main lens to act normally without any deterioration of focusing by superimposing a voltage waveform which is similar to the anode voltage ripple comonent as described above on the first convergent electrode.

If, in this case, the connection of the condenser 7 is changed from between the second convergent electrode and the anode in the first example to the one bet-

ween the second convergent electrode and the standard voltage, a further improvement of the focus can be expected in a locally b right screen as is shown in Figure 2. This will be explained by referring to Figures 6 and 7.

In the case where the screen as a whole is dark as in the case where characters are received by the personal computer, a dynamic focus effect by the four-eye lens is obtained without any adverse side effect as in the case of the conventional example and, as such, it is a technique which belongs to the realm of public knowledge. Nevertheless, let us explain it below.

In this case, the ripple voltage which is in conformity with the screen contents of the anode electr-rode (G4) is small.

The ripple voltage portion which is in conformity with the screen b rightness which is superimposed on the direct current voltage that is supplied to the first convergent electrode through the resistance 2 and the first convergent voltage adjusting variable resistor 4 is small and the focus voltage/anode voltage ratio does no t change even in the case of smoothing by the condenser 9, thereby showing no deterioration by the main lens.

In addition, the voltage which is approximately in the shape of a parabola that has been impressed to the first convergent electrode through a condenser 9 (th e re is no superimposition of the brightness component on voltage c due to the darkness of the screen)

does not appear in the second convergent electrode as it is smoothed by the condenser 7, thereby producing a parabola-like electric potential difference between the first convergent electrode and the second convergent electrode, making it possible to effect a screen peripheral focus imp rovement as in the known example.

In the case where a locally bright scene as shown in Figure 2 has been received, a brightness signal is generated at b and this component is added to the parabola voltage so as to ride the first convergent electrode.

The second convergent electrode voltage will only be of the direct current component by the smoothing effect of the condenser 7 and the parabola voltage plus the voltage which is in conformity with the brightness are impressed between the first convergent electrode and the second convergent electrode.

The relationship between the first convergent electrode and the second convergent electrode will be shown in Figure 7.

At the b r ight part on the screen, the electric potential difference b etween both electrodes becomes greater as compared with the case where it is dark, with a consequence that the function of the four-eye lens is stregthened and over-convergence results.

It is generally the case that the optimal focus voltage characteristics of the braun tube are as shown in Figure 3. Thus, it is learned that there is a need to further lower the focus voltage to obtain over-convergence in the high beam electric current range.

In this example, the focus ratio is maintained constant in the case where the screen is dark and, in the high beam electric current range, the focus deterioration of the main lens which is constituted by the anode electrode and the first cinvergent electrode is prevented and, at the same time, the four-eye lens can be brought in to the state of over-convergence, thereby making it possible to use same in conformity with the general braun tube focus characteristics and to expect a focus improvement.

(Effect of the Invention)

This invention has the effect of achieving a reduction in manufacturing cost as it is only necessary to change the connection position of the condenser that is connected to the second convergent electrode, in particular, almost without an increase in the number of the parts required and in the material cost as compared with the technology according to prior art.

4. Concise Explanation of the Drawings

Figure 1 shows an example of this invention. Figure 2 shows the screen of a reveiver that has received a locally bright design. Figure 3 shows the braun tube optimal focus voltage characteristics. Figure 4 shows the structure of a braun tube electron gun that is equipped with the first convergent electrode and the second convergent electrode.

Figure 5 shows the voltage waveforms of the various parts. Figure 6 shows the second example of this invention. Figure 7 shows the relationship between the first convergent voltage and the seconc convergent electrode shown in Figure 6.

In the above drawings, the following codes have been used:

1. Flyback transfo rmer

3. Second convergent voltage adjustment variable resistor.

4. First convergent voltage adjustment variable resistor.

7. Condenser for anode voltage ripple superimposition.

9. Condenser for dynamic focus voltage superimposition.

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(Insert Figure 1 on p. 638. 11. Power source. (a) Dynamic focus parabola voltage.)

(Insert Figure 2 on p. 638. a. White. b. Black.)

(Insert Figure 3 on p. 638. c. Focus voltage/ anode voltage. d. Beam elect ric current (mA).)

(Insert Figure 4 on p. 638.)

(Insert Figure 5 on p. 638.)

(Insert Figure 6 on p. 639. 11. Power source. (a) Dynamic focus parabola voltage.)

(Insert Figure 7 on p. 639. (a) In the case where the screen is dark. (b) In the case where the screen is locally bright. G3-1. (First convergent voltage). G3-2. (Second convergent voltage).)